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## (54) FOOD PRODUCT WITH ADJUSTED FATTY ACID COMPOSITION

### (57)Abstract:

PROBLEM TO BE SOLVED: To obtain a meat product capable of exhibiting nutritionally excellent characteristics without any found difference from conventional products in tasting properties and texture, especially the meat product expectable of prophylactic effects on life style-related diseases represented by circulatory system diseases.

SOLUTION: This meat product is obtained by suitably adjusting the ratio of an animal fat and a vegetable oil and fat and/or a fish oil used and thereby respectively regulating the ratios of a saturated fatty acid, a monovalent unsaturated fatty acid and polyvalent unsaturated fatty acid occupied in the whole fatty acids within the ranges of 28-30%, 40-43% and 28-30%.

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**CLAIMS**

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[Claim(s)]

[Claim 1] By adjusting suitably a using rate of animal fat, vegetable fat and oil, and/or fish oil, A meat product which excelled [ rate / of saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid which are occupied in total fatty acid ] in taste, a texture, and a nutrition target which were adjusted to a range which are 28 to 30%, 40 to 43%, and 28 to 30%, respectively.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]In this invention, one sort of vegetable fat and oil and/or fish oil or two sorts or more are added to the meat product which uses meat as the main raw material.

Therefore, there are very many advantages on the nutrition which adjusted fatty acid balance, and about the meat product which was moreover excellent in taste and a texture, especially the excess of ingestion of animal fat is avoided, and it is related with the meat product for taking in good animal protein positively for the purpose of contributing to human health maintenance.

[0002]

[Description of the Prior Art]A meat product is a supply source of good animal protein, and a child's posture has improved at the same time the incidence rate of circulatory system diseases, such as cerebral apoplexy and myocardial infarction, falls and a life expectancy is prolonged, when ingestion of animal protein increases. However, since it says that the high price of a serum cholesterol value affects generating of ischemic heart disease in recent years, it comes to refrain from ingestion of dietary cholesterol, and attention has come to be paid past [ of the animal fat which leads to the rise of serum cholesterol especially ] catching

[0003]As solution of such a nutritional problem, some improved methods are proposed also about the meat product containing many animal fat. For example, the manufacturing method of the low-fat meat product is indicated by JP,H7-87935,A and JP,H10-117729,A. Respectively, it is going to improve the debasement of the meat product accompanying the reduction of a fat content by adding MIKORO fibrillation cellulose and transglutaminase.

[0004]How to use the emulsified matter of the whey protein which carried out heat denaturation, and edible fats and oils as substitution of animal fat (special playback common No. 804669 [ nine to ]), The method (JP,H2-182171,A) of using refrigeration or deep freeze milk, the method of using an edible surface-active agent and the emulsified matter of edible fats and oils (soybean oil etc.) (JP,5-3263,B), The method (JP,51-5463,B) of using the emulsified matter which uses wheat gluten and vital gluten, and linolic acid as the main ingredients, etc. are indicated.

[0005]However, it is a key objective that these the patents of all carry out reduction of the animal fat contained in a meat product relatively.

The way of thinking of contributing to human health more positively by adjusting the fatty acid balance of the whole fat including animal fat was not found at all.

[0006]

[Problem to be solved by the invention]It is made clear from many epidemiological survey that the incidence rate of cancer or an infectious disease will go up if the relation of the above-mentioned high price of serum cholesterol and generating of ischemic heart disease has too low a serum cholesterol value conversely. Even if there is an optimum level in a serum cholesterol value, and it is too high and too low, it is not desirable on

healthy. And it is called ideal that how to catch the fat for preventing the illness which should also be called these lifestyle-related diseases now adjusts the rate of saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid to 28 to 30%, 40 to 43%, and 28 to 30% of range as fatty acid composition.

[0007]this invention is \*\* made in light of the above-mentioned circumstances, and as prevention foods of a lifestyle-related disease, it is economical and aims at providing the meat product excellent in taste or a texture.

[0008]

[Means for solving problem]Also in [ as a result of inquiring wholeheartedly that this invention persons should solve an aforementioned problem ] a meat product with it, [ remarkable percentage of saturated fatty acid and monounsaturated fatty acid, and ] [ high ] When the percentage of monounsaturated fatty acid and polyunsaturated fatty acid adds suitably one sort of high vegetable fat and oil and/or fish oil, or two sorts or more, The fatty acid composition of the product concerned is able to adjust so that saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid may serve as 28 to 30%, 40 to 43%, and 28 to 30% of range, respectively, It finds out that it is equal in any way with the taste of the meat product of the former [ meat product / containing the fat adjusted with the described method ] regardless of how of the rate of fats and oils, or a texture, and came to complete this invention based on such knowledge.

[0009]

[Mode for carrying out the invention]Hereafter, this invention is explained concretely. With the meat product of this invention, all dry diet processed meat, such as bacon, roast ham, a boneless ham, a pressed ham, a sausage, a dry sausage, and raw ham, non-heating meat products, the specific heating meat products, and heating meat products are included. As for the raw material meat used for these meat products, poultry meat, rabbit meat, fish meat, etc. besides meat, such as pork and beef, are used.

[0010]Animal fat puts the fat tissue of the fat contained in the above-mentioned raw material meat or a pig, a cow, the sheep, a horse, a goat, domestic fowls, and rabbit origin. The fat or the saturated fatty acid of fat tissue, monounsaturated fatty acid, and the polyunsaturated-fatty-acid presentation which are included in each raw material meat, In general Per [ edible portion 100g ], For example, pork loin 4.8: 5.5: 0.9, pig shoulder butt meat 6.6: 7.1: 1.5, pig round 1.1: It is 1.1:0.3, pork-back-fat 32.3:33.7:9.3, cow sirloin 3.2:3.8:0.2, cow ribulose 3.8:4.1:0.3, cow back fat 30.3:42.0:1.8, chicken-thighs 1.8:3.0:1.1, and chicken breast 0.6:0.8:0.3 grade.

[0011]On the other hand with the vegetable fat and oil used by this invention, all the cooking oil, such as rape oil, soybean oil, safflower oil, olive oil, palm oil, corn oil, sunflower seed oil, cottonseed cake oil, coconut oil, and peanut oil, is included, The saturated fatty acid of each fats and oils, monounsaturated fatty acid, and a polyunsaturated-fatty-acid presentation, Per 100g of edible portions, in general for example, It is rape oil 6.1:57.4:30.7, soybean oil 14.0:23.2:57.4, safflower oil 9.4:12.7:72.5, olive-oil 12.3:71.2:10.5, sunflower-seed-oil 9.8:17.9:66.5, and coconut oil 84.9:6.5:1.9 grade.

[0012]Although fish oil of the eye socket fat origin of large-sized marine fish, such as what was extracted from blue-skinned fish, such as a sardine, a mackerel, a horse mackerel, a salmon, and a Pacific saury, a tuna, and a bonito, krill oil, the fats and oils extracted from Tara or cuttlefish liver, etc. are raised with the fish oil used by this invention, It is more desirable to use fish oil containing many fatty acid of few omega-3 systems to animal fat, such as alpha-linoleic acid, eicosapentaenoic acid, and docosapentaenoic acid. In consideration of \*\*\*\*, 0.1 to 10.0% of the total fat amount is suitable for the amount used. When there is much amount of the fish oil used, antioxidants, such as sodium ascorbate, erythorbic acid, sodium erythorbate, and tocopherol, are used suitably.

[0013]In adjusting fatty acid composition using the above fats and oils, the fatty acid composition of vegetable fat and oil and/or fish oil which are used as raw material meat or the animal fat tissue which adds separately, and an object for fatty acid adjustment should be measured a priori. With a conventional method, if methyl esterification of the fatty acid is carried out, for example with the chloride-methanol method etc., it can analyze the fatty acid composition of all the fatty acid derivatives that are carrying out the ester bond with gas chromatography.

[0014]the conditions of gas chromatography -- a column-EG20M capillary column (0.25mm i.d.x -- 30 m) 0.25 micrometer of film pressure, and column temperature:140-240 \*\* (3-5 \*\* / min.) Temperature up, an inlet, and detection temperature: It is 240-250 \*\*, split ratio:1.25-50, carrier gas and flow:helium, 40 - 50 ml/min, and makeup gas:N<sub>2</sub> and 40 - 50 ml/min, and a fixed quantity of each amounts of fatty acid are made from a peak area using an internal standard method. And the using rate of each fats and oils is determined that the rate of the saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid which are occupied in total fatty acid will serve as a range which are 28 to 30%, 40 to 43%, and 28 to 30%, respectively based on a measurement result.

[0015]There is no restriction in the addition method of fats and oils, and it carries out according to the characteristic of the target meat product. For example, in the sausage of thin \*\* and rough \*\*, it is added in accordance with a conventional method at the time of cutting and mixing, or curing, respectively. In this case, it is also possible to create an emulsified matter using some of vegetable fat and oil and/or fish oil which are used beforehand, water, and emulsifiers, and to add the emulsified matter concerned. Soybean protein, wheat protein, blood protein, egg protein, milk protein, polyglyceryl fatty acid ester, a glycerine fatty acid ester, sucrose fatty acid ester, propylene glycol fatty acid ester, etc. can be used for an emulsifier.

[0016]In meat products which pour in a curing agent, such as roast ham, a boneless ham, and bacon, the purpose can be attained by mixing fats and oils in a parenteral solution. Using the above-mentioned emulsifier, mixing of fats and oils creates an emulsified matter using some of the method of emulsifying the whole parenteral solution, the vegetable fat and oil used beforehand and/or fish oil, water, and emulsifiers, and becomes possible by the method of making a parenteral solution distributing the emulsified matter concerned etc. Although there is no restriction in the rate of the fats and oils occupied to a meat product, 10 to 40% of range is usually suitable from a viewpoint of taste and a texture. If it says from the main point of this invention, it is not necessary to make it a low-fat meat product in particular.

[0017]Below, working example, a comparative example, and a reference example explain this invention still in detail.

(working example 1 Vienna sausage) The pig UDE meat, the pork back fat, rape oil, and soybean oil which contain a fat 25% were selected as fundamental raw material. As a result of gas chromatography's analyzing, the fatty acid percentage of these raw materials was as in the following table 1.

[0018]

[Table 1]

表 1 使用原材料の脂肪酸組成 (g / 100g 食部 100g 当たり)

原材料名	飽和脂肪酸	一価不飽和脂肪酸	多価不飽和脂肪酸
豚ウデ肉の脂肪	34.2	35.8	8.7
豚背脂肪	32.1	33.8	9.3
なたね油	6.0	57.5	36.5
大豆油	14.0	23.5	57.0

[0019]Based on the above-mentioned measurement result, the rate of the raw material containing fats and oils was determined as 50% of pig UDE meat, 1.65% of pork back fat, 4.5% of rape oil, and 6.65% of soybean oil. Hereafter, it was considered as ice water [3% of amyllum tritici, 2.5% of salt, 0.7% of spices, 0.39% of a seasoning, 0.3% of a binding agent, 0.3% of an antioxidant, 0.01% of an artificial color agent, and / 30% of ] = 100%, and the Vienna sausage was manufactured with the entire volume of 60 kg as the conventional method. The ordinary temperature liquefied oil was added with pork back fat at the last time of cutting

[0020](working example 2 Frankfurter) The pig shoulder butt meat, the pork back fat, safflower oil, and olive oil which contain a fat 25% were selected as fundamental raw

material. As a result of gas chromatography's analyzing, the fatty acid percentage of these raw materials was as in the following table 2.

[0021]

[Table 2]

表 2 使用原材料の脂肪酸組成 (R/F食部100g当たり)

原材料名	飽和脂肪酸	一価不飽和脂肪酸	多価不飽和脂肪酸
豚肩ロース肉を末の脂肪	34.0	35.3	9.0
豚背脂肪	32.1	33.8	9.3
サフラワー油	9.3	12.5	12.5
オリーブ油	12.0	71.3	10.5

[0022]Based on the above-mentioned measurement result, the rate of the raw material containing fats and oils was determined as 50% of pig shoulder butt meat, 6.625% of pork back fat, 7.5% of safflower oil, and 5.625% of olive oil. Hereafter, it was considered as ice water [1% of amylum tritici, 5% of soybean protein, 2.5% of salt, 0.7% of spices, 0.44% of a seasoning, 0.3% of a binding agent, 0.3% of an antioxidant, 0.01% of an artificial color agent, and / 20% of ] = 100%, and the frankfurter was manufactured with the entire volume of 60 kg as the conventional method. The ordinary temperature liquefied oil created the emulsified matter using some of soybean protein and water beforehand, and added it after cooling at the last time of cutting

[0023](working example 3 Boneless ham) The analysis result edible-portion 100g Hit, and used the pig round of saturated fatty acid:monounsaturated-fatty-acid:polyunsaturated-fatty-acid =1.1:1.1:0.3 as raw material. this -- safflower oil of working example 2, olive oil, and the analysis result of per edible portion 100g -- saturated fatty acid: -- monounsaturated-fatty-acid: -- the parenteral solution of the following presentation was created using fish oil of the tuna eye socket fat origin of polyunsaturated-fatty-acid =19.0:16.1:30.1.

[0024](Parenteral solution presentation) Maceration [2.6% of safflower oil, 2.4% of olive oil, 0.2% of fish oil, 5.2% of soybean protein, 5.4% of salt, 0.03% of spices, 0.5% of a seasoning, 0.8% of a binding agent, 0.8% of an antioxidant, 0.025% of an artificial color agent, and / 82.045% of ] = 100%.

[0025]Safflower oil, olive oil, and fish oil created the emulsified matter beforehand using a part of soybean protein and maceration, and were made to carry out dispersion mixing to a parenteral solution after cooling. This parenteral solution was poured in 50% per weight of raw material pig round, and the boneless ham was manufactured with the entire volume of 20 kg as the conventional method.

[0026](working example 4 Analysis result) The analysis result of the Vienna sausage, the frankfurter, and the boneless ham manufactured in working example 1, 2, and 3 was shown in the following table 3.

[0027]

[Table 3]

表 3 製造した食肉製品の脂肪酸組成

製品名	脂肪量 (g)	脂肪酸組成 (g)			
		総量	飽和脂肪酸	一価不飽和脂肪酸	多価不飽和脂肪酸
ウィナーソーセージ	28.0	24.2	6.9	10.3	7.0
ブラツカールソーセージ	32.0	29.7	8.5	12.7	8.5
ボツレスハム	4.1	3.8	1.1	1.6	1.1

[0028]All the fatty acid composition of the meat product was adjusted to within the limits whose percentages of saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid are 28 to 30%, 40 to 43%, and 28 to 30%, respectively by adding suitably vegetable fat and oil and/or fish oil as the above-mentioned table 3.

[0029](Comparative example) The inside of the blending ratio of the Vienna sausage

comparative example. The index of the blending ratio of the Vienna sausage manufactured in working example 1, All of rape oil, the inside of the blending ratio of the frankfurter which manufactured soybean oil in working example 2 again and safflower oil, and olive oil were transposed to pork back fat, and the Vienna sausage and the frankfurter were manufactured similarly. By transposing vegetable fat and oil to pork back fat, the blending ratio of raw material was in agreement with it of the almost conventional sausage.

[0030] The result of the organoleptic test of each sausage of working example and a comparative example and physical-properties evaluation was shown in the following table 4. an organoleptic test uses 15 trained panels -- very good (+2) - five-step evaluation until it is dramatically bad (-2) was performed, and the average value was shown.

[0031]

[Table 4]

表 4 各種ソーセージの官能検査及び物性評価結果

検査項目		実施例1	比較例1	実施例2	比較例2
官能検査	(呈味性)				
	旨味の強さ	1.53	1.47	1.33	1.33
	コクの強さ	1.13	1.07	1.53	1.53
	まろやかさ	1.00	0.93	1.20	1.07
	風味の強さ	0.60	0.80	1.33	1.27
	香りの強さ	0.93	0.87	0.87	0.73
	(テクスチャー)				
	弾力	1.53	1.53	0.93	0.93
	咀嚼性	1.07	1.13	0.87	0.87
	ジューシーさ	1.33	1.20	1.07	1.00
フィクソメーター	Tenderness	60.58	60.94	73.27	73.60
	Toughness	1.21	1.24	1.30	1.28
	Pliability	1.92	1.91	2.01	1.97

[0032] Physical-properties evaluation measured Tenderness, Toughness, and Pliability using the TENSHI presser made from TAKEMOTO Electrical and electric equipment. Tenderness shows rupture stress and it becomes a low numerical value as the sausage which is easy to bite off. Toughness shows the total amount of a work load until a sausage is destroyed, and it becomes such a low numerical value that it is soft. Pliability shows pliability and it becomes a numerical value near [as the friable sausage] 1. As shown in the above-mentioned table 4, the difference with a comparative example was not observed in the taste and the texture of the sausage which were obtained in working example 1 and 2.

[0033] (Reference example animal-used-in-disease-modeling experiment)

(Animal) The 5-week old male stroke-prone hypertensive rat was purchased, and after the conditioning for ten days, it divided into three groups (one group n=10) so that average weight might become equal.

(Feed) Three kinds of examination feed shown in the following table 5 was adjusted. The examination feed 1 low protein, animal fat foods, and the examination feed 2 A high protein, animal fat foods, The examination feed 3 was a high protein and adjustment fat diet, and adjustment of a fat uses pork back fat, rape oil, and soybean oil for reference for working example 1, and it was made for fatty acid composition to be saturated fatty acid:monounsaturated-fatty-acid:polyunsaturated-fatty-acid =30%:40%:30%.

[0034]

[Table 5]

表 5 試験飼料組成 (重量%)

成分	試験飼料1	試験飼料2	試験飼料3
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豚赤身肉乾燥粉末	12	20	20
油脂 <sup>1)</sup>	6	6	.....
油脂 <sup>2)</sup>	.....	...	6
セルロース	2	2	2
ミネラル混合物	3.5	3.5	5.5
ビタミン混合物	1	1	1
酒石酸コリン	0.2	0.2	0.2
ショクロース	10	10	10
α-コーンスターチ	65.3	57.3	57.3

[0035](Result) While paying examination feed, blood pressure (UR 5000, UEDA, TOKYO) and a serum cholesterol value (TC, cholesterol oxidase and the p-chlorophenol method) were measured periodically, and the result was shown in the following table 6.

Measurement data was statistically processed using Student t-test.

[0036]

[Table 6]

50	257 <sup>±</sup> 3	161 <sup>±</sup> 25	241 <sup>±</sup> 3 <sup>**</sup>	160 <sup>±</sup> 24	240 <sup>±</sup> 8	103 <sup>±</sup> 18
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\* p (0.05)

\*\* p (0.01)

[0037]Like the above-mentioned table 6, blood pressure showed the low value intentionally from the 20th first by other two groups which gave hyperproteic diet compared with low protein and the examination group which gave animal fat foods after the 30th. On the other hand, the serum total cholesterol level showed the low value intentionally by the adjustment fat diet group compared with two groups which gave animal fat foods after the 40th. Ingestion of animal protein with the above sufficient result showed that adjustment of fatty acid composition had an effect in rise control of a serum total cholesterol level to rise control of blood pressure.

[0038]

[Effect of the Invention]As explained above, by adjusting suitably the using rate of animal fat, vegetable fat and oil, and/or fish oil according to this invention, The meat product adjusted to the range whose percentages of the saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid which are occupied in total fatty acid are 28 to 30%, 40 to 43%, and 28 to 30%, respectively shows the characteristic where the difference with elegance was conventionally observed in neither taste nor a texture and which was excellent in the nutrition target. Offer of the meat product in which the preventive effect over the lifestyle-related disease especially represented by the circulatory system disease is expected is enabled.



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**TECHNICAL FIELD**

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[Field of the Invention]This invention about offer of the prestressed concrete structure object which adopted as the surface the component made of PC steel and the component made of the said steel which have a protective coating, It is related with offer of the prestressed concrete structure objects which adopted the component made of PC steel and the component made of the said steel which formed the blackening protective coating in the surface of the component made of PC steel as a protective coating especially and those manufacturing methods, and also a manufacturing installation.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention]As explained above, in this invention, the using rate of animal fat, vegetable fat and oil, and/or fish oil is adjusted suitably.

Therefore, the meat product adjusted to the range whose percentages of the saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid which are occupied in total fatty acid are 28 to 30%, 40 to 43%, and 28 to 30%, respectively shows the characteristic where the difference with elegance was conventionally observed in neither taste nor a texture and which was excellent in the nutrition target.

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**MEANS**

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[Means for solving problem]Also in [ as a result of inquiring wholeheartedly that this invention persons should solve an aforementioned problem ] a meat product with it, [ remarkable percentage of saturated fatty acid and monounsaturated fatty acid, and ] [ high ] When the percentage of monounsaturated fatty acid and polyunsaturated fatty acid adds suitably one sort of high vegetable fat and oil and/or fish oil, or two sorts or more, The fatty acid composition of the product concerned is able to adjust so that saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid may serve as 28 to 30%, 40 to 43%, and 28 to 30% of range, respectively, It finds out that it is equal in any way with the taste of the meat product of the former [ meat product / containing the fat adjusted with the described method ] regardless of how of the rate of fats and oils, or a texture, and came to complete this invention based on such knowledge. [0009]

[Mode for carrying out the invention]Hereafter, this invention is explained concretely. With the meat product of this invention, all dry diet processed meat, such as bacon, roast ham, a boneless ham, a pressed ham, a sausage, a dry sausage, and raw ham, non-heating meat products, the specific heating meat products, and heating meat products are included. As for the raw material meat used for these meat products, poultry meat, rabbit meat, fish meat, etc. besides meat, such as pork and beef, are used.

[0010]Animal fat puts the fat tissue of the fat contained in the above-mentioned raw material meat or a pig, a cow, the sheep, a horse, a goat, domestic fowls, and rabbit origin. The fat or the saturated fatty acid of fat tissue, monounsaturated fatty acid, and the polyunsaturated-fatty-acid presentation which are included in each raw material meat, In general Per [ edible portion 100g ], For example, pork loin 4.8: 5.5: 0.9, pig shoulder butt meat 6.6: 7.1: 1.5, pig round 1.1: It is 1.1:0.3, pork-back-fat 32.3:33.7:9.3, cow sirloin 3.2:3.8:0.2, cow ribulose 3.8:4.1:0.3, cow back fat 30.3:42.0:1.8, chicken-thighs 1.8:3.0:1.1, and chicken breast 0.6:0.8:0.3 grade.

[0011]On the other hand with vegetable fat and oil used by this invention, all the cooking oil, such as rape oil, soybean oil, safflower oil, olive oil, palm oil, corn oil, sunflower seed oil, cottonseed cake oil, coconut oil, and peanut oil, is included, Saturated fatty acid of each fats and oils, monounsaturated fatty acid, and a polyunsaturated-fatty-acid presentation, Per 100g of edible portions, in general for example, It is rape oil 6.1:57.4:30.7, soybean oil 14.0:23.2:57.4, safflower oil 9.4:12.7:72.5, olive-oil 12.3:71.2:10.5, sunflower-seed-oil 9.8:17.9:66.5, and coconut oil 84.9:6.5:1.9 grade.

[0012]Although fish oil of eye socket fat origin of large-sized marine fish, such as what was extracted from blue-skinned fish, such as a sardine, a mackerel, a horse mackerel, a salmon, and a Pacific saury, a tuna, and a bonito, krill oil, fats and oils extracted from Tara or cuttlefish liver, etc. are raised with fish oil used by this invention, It is more desirable to use fish oil containing many fatty acid of few omega-3 systems to animal fat, such as alpha-linoleic acid, eicosapentaenoic acid, and docosapentaenoic acid. In consideration of \*\*\*, 0.1 to 10.0% of the total fat amount is suitable for the amount used. When there is much amount of the fish oil used, antioxidants, such as sodium ascorbate, erythorbic acid, sodium erythorbate, and tocopherol, are used suitably.

[0013]In adjusting fatty acid composition using the above fats and oils, the fatty acid composition of vegetable fat and oil and/or fish oil which are used as raw material meat

or the animal fat tissue which adds separately, and an object for fatty acid adjustment should be measured a priori. With a conventional method, if methyl esterification of the fatty acid is carried out, for example with the chloride-methanol method etc., it can analyze the fatty acid composition of all the fatty acid derivatives that are carrying out the ester bond with gas chromatography.

[0014]the conditions of gas chromatography -- a column-EG20M capillary column (0.25mm i.d.x — 30 m) 0.25 micrometer of film pressure, and column temperature:140-240 \*\* (3-5 \*\* / min.) Temperature up, an inlet, and detection temperature: It is 240-250 \*\*, split ratio:1.25-50, carrier gas and flow:helium, 40 - 50 ml/min, and makeup gas:N<sub>2</sub> and 40 - 50 ml/min, and a fixed quantity of each amounts of fatty acid are made from a peak area using an internal standard method. And the using rate of each fats and oils is determined that the rate of the saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid which are occupied in total fatty acid will serve as a range which are 28 to 30%, 40 to 43%, and 28 to 30%, respectively based on a measurement result.

[0015]There is no restriction in an addition method of fats and oils, and it carries out according to the characteristic of the target meat product. For example, in a sausage of thin \*\* and rough \*\*, it is added in accordance with a conventional method at the time of cutting and mixing, or curing, respectively. In this case, it is also possible to create an emulsified matter using some of vegetable fat and oil and/or fish oil which are used beforehand, water, and emulsifiers, and to add the emulsified matter concerned. Soybean protein, wheat protein, blood protein, egg protein, milk protein, polyglyceryl fatty acid ester, a glycerine fatty acid ester, sucrose fatty acid ester, propylene glycol fatty acid ester, etc. can be used for an emulsifier.

[0016]In meat products which pour in a curing agent, such as roast ham, a boneless ham, and bacon, the purpose can be attained by mixing fats and oils in a parenteral solution. Using the above-mentioned emulsifier, mixing of fats and oils creates an emulsified matter using some of a method of emulsifying the whole parenteral solution, vegetable fat and oil used beforehand and/or fish oil, water, and emulsifiers, and becomes possible by a method of making a parenteral solution distributing the emulsified matter concerned etc. Although there is no restriction in a rate of fats and oils occupied to a meat product, 10 to 40% of range is usually suitable from a viewpoint of taste and a texture. If it says from main point of this invention, it is not necessary to make it a low-fat meat product in particular.

[0017]Below, working example, a comparative example, and a reference example explain this invention still in detail.

(working example 1 A Vienna sausage) Pig UDE meat, pork back fat, rape oil, and soybean oil which contain a fat 25% were selected as fundamental raw material. As a result of gas chromatography's analyzing, fatty acid percentage of these raw materials was as in the following table 1.

[0018]

[Table 1]

表 1 使用原材料の脂肪酸組成 (g / r.食部100g 当たり)

原材料名	飽和脂肪酸	一価不飽和脂肪酸	多価不飽和脂肪酸
豚バラ肉の脂肪	34.2	35.8	8.7
豚背脂肪	32.1	33.8	9.3
なたね油	6.0	57.5	36.5
大豆油	14.0	23.5	57.0

[0019]Based on the above-mentioned measurement result, a rate of raw material containing fats and oils was determined as 50% of pig UDE meat, 1.65% of pork back fat, 4.5% of rape oil, and 6.65% of soybean oil. Hereafter, it was considered as ice water [3% of amyllum tritici, 2.5% of salt, 0.7% of spices, 0.39% of a seasoning, 0.3% of a binding agent, 0.3% of an antioxidant, 0.01% of an artificial color agent, and / 30% of ] = 100%, and a Vienna sausage was manufactured with entire volume of 60 kg as a conventional method. An ordinary temperature liquidified oil was added with pork back fat at the last time of

An ordinary temperature liquefied oil was added with pork back fat at the last time of cutting

[0020](working example 2 A frankfurter) Pig shoulder butt meat, pork back fat, safflower oil, and olive oil which contain a fat 25% were selected as fundamental raw material. As a result of gas chromatography's analyzing, fatty acid percentage of these raw materials was as in the following table 2.

[0021]

[Table 2]

表 2 使用原材料の脂肪酸組成 (g/可食部100g当たり)

原材料名	飽和脂肪酸	一価不飽和脂肪酸	多価不飽和脂肪酸
豚肩ロース肉を末の脂肪	34.0	35.3	9.0
豚背脂肪	32.1	33.8	9.3
サフラワー油	9.3	12.5	72.5
オリーブ油	12.0	71.3	10.5

[0022]Based on the above-mentioned measurement result, the rate of the raw material containing fats and oils was determined as 50% of pig shoulder butt meat, 6.625% of pork back fat, 7.5% of safflower oil, and 5.625% of olive oil. Hereafter, it was considered as ice water [ 1% of amyllum tritici, 5% of soybean protein, 2.5% of salt, 0.7% of spices, 0.44% of a seasoning, 0.3% of a binding agent, 0.3% of an antioxidant, 0.01% of an artificial color agent, and / 20% of ] = 100%, and the frankfurter was manufactured with the entire volume of 60 kg as the conventional method. The ordinary temperature liquefied oil created the emulsified matter using some of soybean protein and water beforehand, and added it after cooling at the last time of cutting

[0023](working example 3 Boneless ham) The analysis result edible-portion 100g Hit, and used the pig round of saturated fatty acid:monounsaturated-fatty-acid:polyunsaturated-fatty-acid =1.1:1.1:0.3 as raw material. this -- safflower oil of working example 2, olive oil, and the analysis result of per edible portion 100g -- saturated fatty acid: -- monounsaturated-fatty-acid: -- the parenteral solution of the following presentation was created using fish oil of the tuna eye socket fat origin of polyunsaturated-fatty-acid =19.0:16.1:30.1.

[0024](Parenteral solution presentation) Maceration [ 2.6% of safflower oil, 2.4% of olive oil, 0.2% of fish oil, 5.2% of soybean protein, 5.4% of salt, 0.03% of spices, 0.5% of a seasoning, 0.8% of a binding agent, 0.8% of an antioxidant, 0.025% of an artificial color agent, and / 82.045% of ] = 100%.

[0025]Safflower oil, olive oil, and fish oil created the emulsified matter beforehand using a part of soybean protein and maceration, and were made to carry out dispersion mixing to a parenteral solution after cooling. This parenteral solution was poured in 50% per weight of raw material pig round, and the boneless ham was manufactured with the entire volume of 20 kg as the conventional method.

[0026](working example 4 Analysis result) The analysis result of the Vienna sausage, the frankfurter, and the boneless ham manufactured in working example 1, 2, and 3 was shown in the following table 3.

[0027]

[Table 3]

表 3 製造した食肉製品の脂肪酸組成

製品名	脂肪量 (g)	脂肪酸組成 (g)			
		総量	飽和脂肪酸	一価不飽和脂肪酸	多価不飽和脂肪酸
ウィンナーソーセージ	28.0	24.2	6.9	10.3	7.0
フランクフルターソーセージ	32.0	29.7	8.5	12.7	8.5
ボツレスラム	4.1	3.8	1.1	1.6	1.1

[0028]All the fatty acid composition of the meat product was adjusted to within the limits

whose percentages of saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid are 28 to 30%, 40 to 43%, and 28 to 30%, respectively by adding suitably vegetable fat and oil and/or fish oil as the above-mentioned table 3.

[0029](Comparative example) The inside of the blending ratio of the Vienna sausage manufactured in working example 1, All of rape oil, the inside of the blending ratio of the frankfurter which manufactured soybean oil in working example 2 again and safflower oil, and olive oil were transposed to pork back fat, and the Vienna sausage and the frankfurter were manufactured similarly. By transposing vegetable fat and oil to pork back fat, the blending ratio of raw material was in agreement with it of the almost conventional sausage.

[0030]The result of the organoleptic test of each sausage of working example and a comparative example and physical-properties evaluation was shown in the following table 4. an organoleptic test uses 15 trained panels -- very good (+2) - five-step evaluation until it is dramatically bad (-2) was performed, and the average value was shown.

[0031]

[Table 4]

表 4 各種ソーセージの官能検査及び物性評価結果

検査項目		実施例1	比較例1	実施例2	比較例2
官能検査	(呈味性)				
	旨味の強さ	1.53	1.47	1.33	1.33
	コクの強さ	1.13	1.07	1.53	1.53
	まろやかさ	1.00	0.93	1.20	1.07
	風味の強さ	0.60	0.60	1.33	1.27
	香りの強さ	0.93	0.87	0.87	0.73
	(テクスチャー)				
	弾力	1.53	1.53	0.93	0.93
	咀嚼性	1.07	1.13	0.87	0.87
	ジューシーさ	1.33	1.20	1.07	1.00
フィジカル	Tenderness	60.58	60.94	73.27	73.60
	Toughness	1.21	1.24	1.30	1.28
	Pliability	1.92	1.91	2.01	1.97

[0032]Physical-properties evaluation measured Tenderness, Toughness, and Pliability using the TENSHI presser made from TAKEMOTO Electrical and electric equipment. Tenderness shows rupture stress and it becomes a low numerical value as the sausage which is easy to bite off. Toughness shows the total amount of a work load until a sausage is destroyed, and it becomes such a low numerical value that it is soft. Pliability shows pliability and it becomes a numerical value near [as the friable sausage] 1. As shown in the above-mentioned table 4, the difference with a comparative example was not observed in the taste and the texture of the sausage which were obtained in working example 1 and 2.

[0033](Reference example animal-used-in-disease-modeling experiment)

(Animal) The 5-week old male stroke-prone hypertensive rat was purchased, and after the conditioning for ten days, it divided into three groups (one group n= 10) so that average weight might become equal.

(Feed) Three kinds of examination feed shown in the following table 5 was adjusted. The examination feed 1 low protein, animal fat foods, and the examination feed 2 A high protein, animal fat foods, The examination feed 3 was a high protein and adjustment fat diet, and adjustment of a fat uses pork back fat, rape oil, and soybean oil for reference for working example 1, and it was made for fatty acid composition to be saturated fatty acid:monounsaturated-fatty-acid:polyunsaturated-fatty-acid =30%:40%:30%.

[0034]



[Table 5]

表 5 試験飼料組成 (重量%)

成 分	試験飼料 1	試験飼料 2	試験飼料 3
豚赤身肉乾燥粉末	12	20	20
油脂 <sup>1)</sup>	6	6	.....
油脂 <sup>2)</sup>	.....	...	6
セルロース	2	2	2
ミネラル混合物	3.5	3.5	5.5
ビタミン混合物	1	1	1
酒石酸コリン	0.2	0.2	0.2
ショクロース	10	10	10
α-コーンスターチ	55.3	57.3	57.3

[0035] (Result) While paying examination feed, blood pressure (UR 5000, UEDA, TOKYO) and a serum cholesterol value (TC, cholesterol oxidase and the p-chlorophenol method) were measured periodically, and the result was shown in the following table 6.

Measurement data was statistically processed using Student t-test.

[0036]

[Table 6]

表 6 血圧及び血清総コレステロール値の測定結果

(H)	試験飼料 1 群		試験飼料 2 群		試験飼料 3 群	
	血 圧 (mmHg)	総コレステロール (mg/dl)	血 圧 (mmHg)	総コレステロール (mg/dl)	血 圧 (mmHg)	総コレステロール (mg/dl)
0	141±18	131±15	143±12	130±12	142±16	133±15
10	185±8	136±22	178±7	131±21	175±9	128±21
20	218±11	135±28	195±10	134±32	192±8*	105±17
30	241±3	147±38	218±8**	143±43	208±13**	104±15
40	251±6	154±32	237±3**	148±28	236±2**	103±11**
50	257±3	161±25	241±3**	160±24	240±8**	103±18**

\* p (0.05)

\*\* p (0.01)

[0037] Like the above-mentioned table 6, blood pressure showed the low value intentionally from the 20th first by other two groups which gave hyperproteic diet compared with low protein and the examination group which gave animal fat foods after the 30th. On the other hand, the serum total cholesterol level showed the low value intentionally by the adjustment fat diet group compared with two groups which gave animal fat foods after the 40th. Ingestion of animal protein with the above sufficient result showed that adjustment of fatty acid composition had an effect in rise control of a serum total cholesterol level to rise control of blood pressure.

[0038]

[Translation done.]

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(54) 【発明の名称】 脂肪酸組成を調整した食肉製品

(57) 【要約】

【構成】 動物性脂肪と植物性油脂及び／又は魚油の使用割合を適宜調整することにより、全脂肪酸中に占める飽和脂肪酸、一価不飽和脂肪酸及び多価不飽和脂肪酸の割合が夫々28～30%、40～43%及び28～30%の範囲に調整された。

【効果】 本食肉製品は、呈味性やテクスチャーに従来品との相違は認められず、かつ栄養学的に優れた特性を示す。特に、循環器系疾患に代表される生活習慣病に対する予防効果が期待される食肉製品の提供を可能とする。

## 【特許請求の範囲】

【請求項1】 動物性脂肪と植物性油脂及び／又は魚油の使用割合を適宜調整することにより、全脂肪酸中に占める飽和脂肪酸、一価不飽和脂肪酸及び多価不飽和脂肪酸の割合が夫々28～30%、40～43%及び28～30%の範囲に調整された呈味性、テクスチャー及び栄養学的に優れた食肉製品。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、畜肉を主原料とする食肉製品に植物性油脂及び／又は魚油の1種又は2種以上を添加することにより、脂肪酸バランスを調整した栄養学上極めて利点が多く、なおかつ呈味性、テクスチャーに優れた食肉製品に関し、特に動物性脂肪の摂取過多を避け、ヒトの健康維持へ寄与することを目的に、積極的に良質な動物性タンパク質を摂取するための食肉製品に関する。

## 【0002】

【従来の技術】食肉製品は良質な動物性タンパク質の供給源であり、動物性タンパク質の摂取が増えることにより脳卒中や心筋梗塞等の循環器系疾患の発生率は低下し、平均寿命が延びると同時に子供の体位は向上してきた。しかし、近年血清コレステロール値の高値が虚血性心疾患の発生に影響を及ぼすという理由から、食餌性コレステロールの摂取が控えられるようになり、特に、血清コレステロールの上昇に繋がる動物性脂肪の摂りすぎに注意が払われるようになってきた。

【0003】このような栄養学的問題点の解決策として、動物性脂肪を多く含む食肉製品についてもいくつかの改良方法が提案されている。例えば、特開平7-87935号及び特開平10-117729号には低脂肪の食肉製品の製造方法が開示されている。夫々、ミコロフィブリル化セルロース及びトランスグルタミナーゼを添加することで、脂肪含量の低減化に伴う食肉製品の品質低下を改良しようとしたものである。

【0004】更には、動物性脂肪の代替として、加熱変性したホエータンパク質と可食性油脂の乳化物を使用する方法（特再平9-804669号）、冷凍又は深冷乳を使用する方法（特開平2-182171号）、可食性界面活性剤と可食性油脂（大豆油等）の乳化物を使用する方法（特公平5-3263号）、小麦グルテン及び活性グルテンとリノール酸を主成分とする乳化物を使用する方法（特公昭51-5463号）等が開示されている。

【0005】しかし、これら特許の全ては、食肉製品に含まれる動物性脂肪を相対的に低減化することが主目的であり、動物性脂肪を含めた脂肪全体の脂肪酸バランスを調整することで、より積極的にヒトの健康に寄与するという発想は一切見当たらなかった。

## 【0006】

【発明が解決しようとする課題】上記した血清コレステロールの高値と虚血性心疾患の発生との関係とは逆に、血清コレステロール値が低すぎると癌や感染症の発生率が上昇することが、多くの疫学調査から明らかにされている。血清コレステロール値には至適レベルがあり、高すぎても低すぎても健康上好ましくない。そして、現在これら生活習慣病ともいべき疾病を予防するための脂肪の摂り方は、脂肪酸組成として飽和脂肪酸、一価不飽和脂肪酸及び多価不飽和脂肪酸の割合を28～30%、40～43%及び28～30%の範囲に調整することが理想と言われている。

【0007】本発明は上記事情に鑑みてなされたものであり、生活習慣病の予防食として、経済的かつ呈味性やテクスチャーに優れた食肉製品を提供することを目的としている。

## 【0008】

【課題を解決するための手段】本発明者らは上記課題を解決すべく鋭意検討を行なった結果、飽和脂肪酸と一価不飽和脂肪酸の構成比が著しく高い食肉製品においても、一価不飽和脂肪酸と多価不飽和脂肪酸の構成比が高い植物性油脂及び／又は魚油の1種又は2種以上を適宜添加することによって、当該製品の脂肪酸組成が飽和脂肪酸、一価不飽和脂肪酸、多価不飽和脂肪酸が夫々28～30%、40～43%及び28～30%の範囲となるように調整することが可能であり、更に、上記方法で調整された脂肪を含む食肉製品が、油脂の割合の如何を問わず、従来の食肉製品の呈味性やテクスチャーと何ら遜色がないことを見出し、このような知見に基づいて本発明を完成するに至った。

## 【0009】

【発明の実施の形態】以下、本発明について具体的に説明する。本発明の食肉製品とは、ベーコン、ロースハム、ボンレスハム、プレスハム、ソーセージ、ドライソーセージ、生ハム等の乾燥食肉製品、非加熱食肉製品、特定加熱食肉製品及び加熱食肉製品の全てを含む。これら食肉製品に使用する原料肉は、豚肉や牛肉等の畜肉の他、家禽肉、家兎肉、魚肉等が用いられる。

【0010】動物性脂肪とは、上記原料肉に含まれる脂肪又は豚、牛、羊、馬、山羊、家禽、家兎由来の脂肪組織をさす。夫々の原料肉に含まれる脂肪又は脂肪組織の飽和脂肪酸、一価不飽和脂肪酸及び多価不飽和脂肪酸組成は、概ね可食部100g当たり、例えば豚ロース肉4.8:5.5:0.9、豚肩ロース肉6.6:7.1:1.5、豚もも肉1.1:1.1:0.3、豚背脂肪32.3:33.7:9.3、牛サーロイン3.2:3.8:0.2、牛リブロース3.8:4.1:0.3、牛背脂肪30.3:42.0:1.8、鶏もも肉1.8:3.0:1.1、鶏むね肉0.6:0.8:0.3等である。

【0011】一方、本発明で使用する植物性油脂とは、

なたね油、大豆油、サフラワー油、オリーブ油、パーム油、とうもろこし油、ひまわり油、綿実油、やし油、落花生油等の食用油の全てを含み、夫々の油脂の飽和脂肪酸、一価不飽和脂肪酸及び多価不飽和脂肪酸組成は、概ね可食部100g当たり、例えば、なたね油6.1:57.4:30.7、大豆油14.0:23.2:57.4、サフラワー油9.4:12.7:72.5、オリーブ油12.3:71.2:10.5、ひまわり油9.8:17.9:66.5、やし油84.9:6.5:1.9等である。

【0012】又、本発明で使用する魚油とは、イワシ、サバ、アジ、サケ、サンマ等の青背魚から抽出したもの、マグロやカツオ等の大型海産魚の眼窩脂肪由来の魚油、オキアミ油、タラやイカ肝臓より抽出した油脂等があげられるが、 $\alpha$ -リノレン酸、エイコサペンタエン酸、ドコサペンタエン酸等、動物性脂肪には少ない $\omega$ -3系の脂肪酸を多く含む魚油を使用する方が好ましい。使用量は魚臭を考慮して、総脂肪量の0.1~10.0%が適当である。魚油の使用量が多い場合は、適宜アスコルビン酸ナトリウム、エリソルビン酸、エリソルビン酸ナトリウム、トコフェロール等の酸化防止剤が利用される。

【0013】以上の油脂を用いて脂肪酸組成を調整するに当たっては、原料肉又は別途添加する動物性脂肪組織及び脂肪酸調整用として使用する植物性油脂及び／又は魚油の脂肪酸組成を事前に測定すべきである。脂肪酸は常法により、例えば塩酸-メタノール法等によりメチルエステル化すると、エステル結合しているあらゆる脂肪酸誘導体の脂肪酸組成をガスクロマトグラフィーで分析できる。

【0014】ガスクロマトグラフィーの条件は、カラム:PEG20Mキャピラリーカラム(0.25mm i. d.  $\times$  30m、膜厚0.25 $\mu$ m)、カラム温度:140~240 $^{\circ}$ C(3~5 $^{\circ}$ C/min、昇温)、注入口及び検出温度:240~250 $^{\circ}$ C、スプリット比:1.25~50、キャリアーガス及び流量:He、40~50ml/min、メイクアップガス:N<sub>2</sub>、40~50

ml/minであり、内標準法を用いて、ピーク面積から各脂肪酸量が定量できる。そして、測定結果に基づき、全脂肪酸中に占める飽和脂肪酸、一価不飽和脂肪酸及び多価不飽和脂肪酸の割合が夫々28~30%、40~43%及び28~30%の範囲となるように夫々の油脂の使用割合が決定される。

【0015】油脂の添加方法に制限はなく、対象となる食肉製品の特성에応じて実施される。例えば、細挽及び粗挽のソーセージでは、常法に従い、夫々カッティング及びミキシングあるいはキュアリング時に添加される。この場合、予め使用する植物性油脂及び／又は魚油と水と乳化剤の一部を用いて乳化物を作成し、当該乳化物を添加することも可能である。乳化剤には大豆タンパク質、小麦タンパク質、血液タンパク質、卵タンパク質、乳タンパク質、ポリグリセリン脂肪酸エステル、グリセリン脂肪酸エステル、ショ糖脂肪酸エステル、プロピレングリコール脂肪酸エステル等が利用できる。

【0016】又、ロースハム、ボンレスハム、ベーコン等、塩漬剤を注入する食肉製品では、注射液に油脂を混入することで目的が達せられる。油脂の混入は上記乳化剤を用いて、注射液全体を乳化する方法、予め使用する植物性油脂及び／又は魚油と水と乳化剤の一部を用いて乳化物を作成し、当該乳化物を注射液に分散させる方法等によって可能となる。食肉製品に占める油脂の割合に制限はないが、呈味性及びテクスチャーの観点から、通常10~40%の範囲が適当である。本発明の主旨から言えば、特に低脂肪の食肉製品にする必要はない。

【0017】以下に、実施例、比較例及び参考例により本発明を更に詳細に説明する。

(実施例1 ウィンナーソーセージ) 25%脂肪を含有する豚ウデ肉、豚背脂肪、なたね油及び大豆油を基本的な原材料として選定した。ガスクロマトグラフィーで分析した結果、これら原材料の脂肪酸構成比は下記表1の通りであった。

【0018】

【表1】

表 1 使用原材料の脂肪酸組成 (g/可食部100g当たり)

原材料名	飽和脂肪酸	一価不飽和脂肪酸	多価不飽和脂肪酸
豚ウデ肉由来の脂肪	34.2	35.8	8.1
豚背脂肪	32.1	33.8	9.3
なたね油	6.0	57.5	30.5
大豆油	14.0	23.5	57.0

【0019】上記の測定結果をもとに、油脂を含む原材料の割合を豚ウデ肉50%、豚背脂肪1.65%、なたね油4.5%及び大豆油6.65%に決定した。以下、小麦澱粉3%、食塩2.5%、香辛料0.7%、調味料0.39%、結着剤0.3%、酸化防止剤0.3%、発

色剤0.01%、氷水30%=100%とし、全重量60kgで常法通りウィンナーソーセージを製造した。なお、常温液状油は豚背脂肪と共にカッティングの最終時点で添加した。

【0020】(実施例2 フランクフルトソーセージ)

25%脂肪を含有する豚肩ロース肉、豚背脂肪、サフラワー油及びオリーブ油を基本的な原材料として選定した。ガスクロマトグラフィーで分析した結果、これら原

材料の脂肪酸構成比は下記表2の通りであった。

【0021】

【表2】

表 2 使用原材料の脂肪酸組成 (g/可食部100g当たり)

原材料名	飽和脂肪酸	一価不飽和脂肪酸	多価不飽和脂肪酸
豚肩ロース肉由来の脂肪	34.0	35.3	9.0
豚背脂肪	32.1	33.8	9.3
サフラワー油	9.3	12.5	72.5
オリーブ油	12.0	71.0	10.5

【0022】上記の測定結果をもとに、油脂を含む原材料の割合を豚肩ロース肉50%、豚背脂肪6.625%、サフラワー油7.5%、オリーブ油5.625%に決定した。以下、小麦澱粉1%、大豆タンパク質5%、食塩2.5%、香辛料0.7%、調味料0.44%、結着剤0.3%、酸化防止剤0.3%、発色剤0.01%、氷水20%=100%とし、全体量60kgで常法通りフランクフルトソーセージを製造した。なお、常温液状油は予め大豆タンパク質と水の一部を用いて乳化物を作成し、冷却後、カッティングの最終時点で添加した。

【0023】(実施例3 ポンレスハム) 分析結果が可食部100g当たり飽和脂肪酸:一価不飽和脂肪酸:多価不飽和脂肪酸=1.1:1.1:0.3の豚もも肉を原材料として使用した。これに実施例2のサフラワー油とオリーブ油及び可食部100g当たりの分析結果が飽和脂肪酸:一価不飽和脂肪酸:多価不飽和脂肪酸=19.0:16.1:30.1のマグロ眼窩脂肪由来の魚

油を用いて下記組成の注射液を作成した。

【0024】(注射液組成) サフラワー油2.6%、オリーブ油2.4%、魚油0.2%、大豆タンパク質5.2%、食塩5.4%、香辛料0.03%、調味料0.5%、結着剤0.8%、酸化防止剤0.8%、発色剤0.025%、加水82.045%=100%。

【0025】サフラワー油、オリーブ油及び魚油は、大豆タンパク質と加水の一部を用いて予め乳化物を作成し、冷却後、注射液に分散混合させた。この注射液を原料豚もも肉の重量当たり50%注入し、全体量20kgで常法通りボンレスハムを製造した。

【0026】(実施例4 分析結果) 実施例1、2及び3で製造したウィンナーソーセージ、フランクフルトソーセージ及びボンレスハムの分析結果を下記表3に示した。

【0027】

【表3】

表 3 製造した食肉製品の脂肪酸組成

製品名	脂肪量 (g)	脂肪酸組成 (g)			
		総量	飽和脂肪酸	一価不飽和脂肪酸	多価不飽和脂肪酸
ウィンナーソーセージ	26.0	24.2	6.9	10.3	7.0
フランクフルトソーセージ	32.0	29.7	8.5	12.7	8.5
ボンレスハム	4.1	3.8	1.1	1.6	1.1

【0028】上記表3の通り、植物性油脂及び/又は魚油を適宜添加することによって、食肉製品の脂肪酸組成は全て飽和脂肪酸、一価不飽和脂肪酸及び多価不飽和脂肪酸の割合が夫々28~30%、40~43%及び28~30%の範囲内に調整された。

【0029】(比較例) 実施例1で製造したウィンナーソーセージの配合割合中、なたね油と大豆油を、又、実施例2で製造したフランクフルトソーセージの配合割合中、サフラワー油とオリーブ油を全て豚背脂肪に置き換えて、同様にウィンナーソーセージ及びフランクフルト

ソーセージを製造した。植物性油脂を豚背脂肪に置き換えることによって、原材料の配合割合はほぼ従来のソーセージのそれと一致した。

【0030】下記表4に実施例と比較例の夫々のソーセージの官能検査及び物性評価の結果を示した。官能検査は訓練されたパネル15名を用い、非常によい(+2)~非常に悪い(-2)までの5段階評価を行ない、その平均値を示した。

【0031】

【表4】

表 4 各種ソーセージの官能検査及び物性評価結果

検査項目		実施例1	比較例1	実施例2	比較例2
官能検査	(呈味性)				
	旨味の強さ	1.53	1.47	1.33	1.33
	コクの強さ	1.13	1.07	1.53	1.53
	まろやかさ	1.00	0.93	1.20	1.07
	風味の強さ	0.80	0.80	1.33	1.27
	香りの強さ	0.93	0.87	0.87	0.73
	(テクスチャー)				
	弾力	1.53	1.53	0.93	0.93
	咀嚼性	1.07	1.13	0.87	0.87
	ジューシーさ	1.33	1.20	1.07	1.00
テンシ/レッサー	Tenderness	60.58	60.94	73.27	73.86
	Toughness	1.21	1.24	1.30	1.28
	Pliability	1.92	1.91	2.01	1.97

【0032】物性評価はタケモト電気(株)製テンシプレッサーを用いて、Tenderness, Toughness及びPliabilityを測定した。Tendernessとは破断応力を示し、噛み切りやすいソーセージ程低い数値となる。Toughnessとはソーセージが破壊されるまでの仕事量の総量を示し、柔らかい程低い数値となる。Pliabilityとは柔軟性を示し、パサパサしたソーセージ程1に近い数値となる。上記表4のように、実施例1及び2で得られたソーセージの呈味性及びテクスチャーに比較例との差は認められなかった。

【0033】〈参考例 疾患モデル動物実験〉

(動物) 5週齢の雄性脳卒中易発性高血圧ラットを購入し、10日間の順化の後、平均体重が等しくなるように3群(1群n=10)に分けた。

(飼料) 下記表5に示した3種類の試験飼料を調整した。試験飼料1は低タンパク質、動物性脂肪食、試験飼料2は高タンパク質、動物性脂肪食、試験飼料3は高タンパク質、調整脂肪食であり、脂肪の調整は実施例1を参照に豚背脂肪、なたね油及び大豆油を用いて、脂肪酸組成が飽和脂肪酸：一価不飽和脂肪酸：多価不飽和脂肪酸=30%：40%：30%になるようにした。

【0034】

【表5】

表 5 試験飼料組成(重量%)

成分	試験飼料1	試験飼料2	試験飼料3
豚赤身肉乾燥粉末	12	20	20
油脂 <sup>1)</sup>	6	6	.....
油脂 <sup>2)</sup>	.....	.....	6
セルロース	2	2	2
ミネラル混合物	3.5	3.5	3.5
ビタミン混合物	1	1	1
酒石酸コリン	0.2	0.2	0.2
シュクロース	10	10	10
α-コーンスターチ	65.3	57.3	57.3

【0035】(結果) 試験飼料を給与中、定期的に血圧(UR 5000, UEDA, TOKYO)及び血清コレステロール値(TC, コレステロールオキシダーゼ・p-クロロフェノール法)を測定し、その結果を下記

表6に示した。なお、測定データはStudent t-testを用いて統計的に処理した。

【0036】

【表6】

表 6 血圧及び血清総コレステロール値の測定結果

(日)	試験飼料 1 群		試験飼料 2 群		試験飼料 3 群	
	血 圧 (mmHg)	総コレステロール (mg/dl)	血 圧 (mmHg)	総コレステロール (mg/dl)	血 圧 (mmHg)	総コレステロール (mg/dl)
0	141±18	131±15	143±12	130±12	142±16	133±15
10	185±8	138±22	178±7	131±21	175±9	128±21
20	213±11	135±28	195±10	134±32	192±8*	105±17
30	241±3	147±38	218±8**	143±43	209±13**	104±15
40	251±6	154±32	237±3**	148±28	236±2**	103±11**
50	257±3	161±35	241±3**	160±24	240±8**	103±18**

\* p (0.05)    \*\* p (0.01)

【0037】上記表6のように、低タンパク質、動物性脂肪食を与えた試験群に比べ、まず血圧は高タンパク質食を与えた他の2群で20日目から30日目以降有意に低値を示した。一方、血清総コレステロール値は動物性脂肪食を与えた2群に比べ、調整脂肪食群で40日目以降有意に低値を示した。以上の結果は、十分な動物性タンパク質の摂取は血圧の上昇抑制に、脂肪酸組成の調整は血清総コレステロール値の上昇抑制に効果があることを示した。

【0038】

【発明の効果】以上説明したように、本発明によれば動物性脂肪と植物性油脂及び／又は魚油の使用割合を適宜調整することにより、全脂肪酸中に占める飽和脂肪酸、一価不飽和脂肪酸及び多価不飽和脂肪酸の割合が夫々28～30%、40～43%及び28～30%の範囲に調整された食肉製品は、呈味性やテクスチャーに従来品との相違は認められず、かつ栄養的に優れた特性を示す。特に、循環器系疾患に代表される生活習慣病に対する予防効果が期待される食肉製品の提供を可能とする。

フロントページの続き

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